

Impact of Sex Reassignment Surgery on Lower Urinary Tract Function

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Abstract

Objective: To investigate the effects of sex reassignment surgery (SRS) on lower urinary tract function.

Methods: A questionnaire concerning voiding habits and lower urinary tract symptoms after sex reassignment surgery, was given to 24 female-to-male transsexuals (FTM) and 31 male-to-female transsexuals (MTF), who respectively underwent phalloplasty and vaginoplasty. For this study only Dutch speaking patients were selected. Also, uro-flowmetry data from 92 FTM transsexuals were reviewed.

Results: In general, no change in voiding patterns was observed. Post-void dribbling was reported by 79% of the FTM transsexuals, and 16% of the MTF group reported some form of incontinence. The uro-flowmetry examination showed a mean, non-significant decrease of 2 ml/s in Q_{\max} in FTM patients.

Conclusion: SRS can cause minor changes in urinary habits. Even if they do not result in patients seeking medical help, transsexuals should be warned about these eventual discomforts pre-operatively.

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1. Introduction

Sex reassignment surgery (SRS) is considered to be the gold standard in the treatment of gender dysphoria [1]. The different procedures involved for female-to-male (FTM) transsexuals are mastectomy, hysterectomy, ovariectomy, scrotoplasty and phalloplasty. For male-to-female (MTF), breast reconstruction, orchidectomy, penectomy and vaginoplasty are the procedures.

In phalloplasty, the radial forearm free flap is recognized to give the best results, both functionally and aesthetically [2]. Ideally, phallic reconstruction should strive for a one-stage microsurgical procedure that can

be reproduced predictably, with creation of a competent neourethra to allow for voiding while standing, return of tactile and erogenous sensibility, enough bulk to tolerate the insertion of a prosthesis (to be able to have sexual intercourse) and a result that is aesthetically acceptable to the patient [3,4]. Minimal scarring or disfigurement and no functional loss in the donor area are further requirements for any ideal procedure [2,4].

For vaginoplasty in MTF transsexuals, the surgical aim of genital reassignment surgery [1,5–8] is to create a perineogenital complex as feminine in appearance and function as possible. These requirements should be met without major surgical intervention necessitating long and distressing post-operative treatment, and addressing them should not create new lesions or donor area malfunction [5,6].

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Complications of phalloplasty and vaginoplasty have been reported in the literature [9–26]. In particular, fistulae and strictures are common problems following creation of an additional urethra in phalloplasty [2,4,10–12]. In vaginoplasty, using the inverted penoscrotal skin flap, the urethra is shortened and strictures of the neomeatus have been reported. As in both reconstructive procedures the urethra is part of the reconstructed area, one should wonder if these procedures cause any changes in lower urinary tract function and, if so, whether such changes are a problem to patients.

In order to investigate the impact of surgery on voiding habits and lower urinary tract function, we designed a questionnaire-based study for individuals who had undergone SRS at the Ghent University Hospital over a 10-year period. In addition, information in a prospective database of uro-flowmetry characteristics for 92 FTM transsexuals pre- and post-operatively, was reviewed.

2. Material and methods

Between November 1993 and April 2003, 105 phalloplasties with the radial forearm flap (with the “Chinese” modified technique [27]) and 127 vaginoplasties with the penoscrotal inverted skin flap [28–30] modified [7,20,31] were performed. Of these 232 transsexuals, 107 Dutch-speaking patients (63 FTM and 44 MTF) who had undergone SRS at least one year previously, were contacted. Thirty patients (28%) could not be reached (especially MTF), 15 (mainly FTM) refused to cooperate because they did not wish to be confronted with their past, and 7 people were willing to cooperate but only if it did not involve coming to the clinic.

The remaining 55 patients were all interviewed individually and examined by a multidisciplinary team (a psychologist or a sexologist, a surgeon and an endocrinologist) in order to perform an extended follow up evaluation of the different aspects of SRS. None of the researchers had been involved in the initial assessment or treatment of these patients.

During the interview, a follow-up questionnaire specific for urinary changes was administered to these patients. This questionnaire had been designed by the urologist team member (PH); it concerned urinary habits and problems before and after SRS (see Table 1 for the specific questions asked). The only possible questionnaire was a non validated open questionnaire. In transsexual patients more interventions are done than just surgical interventions. Next to surgery, hormonal therapy and psychiatric treatment is given. The only reasonable validation would be to compare with groups of patients who underwent only psychiatric, only hormonal and psychiatric therapy and hormonal therapy. Due to the low prevalence of transsexualism, this validation was impossible.

As there are some concerns in phalloplasty about the effect of the extra urethral length on flow characteristics, all patients having phalloplasty routinely undergo uro-flowmetry pre- and post-operatively. Data from 92 patients, especially Q_{\max} and the form of the curve, were reviewed for this study. In all patients residual urine was measured after uroflowmetry.

3. Results

The questionnaire was administered to 55 operated transsexual patients (24 FTM and 31 MTF); the average time of follow up post-operatively was 3 years and 8 months (range: 1–12 years). The results of the questionnaire are given in Table 1.

3.1. Female-to-male

In this group of 24 patients, 9 patients (37.5%) reported that voiding had changed after phalloplasty

Table 1
Questionnaire concerning urinary habits and problems

Question	FTM (<i>n</i> = 24)	MTF (<i>n</i> = 31)
1. Have you noticed any voiding change after SRS?	Yes 9 (37.5%)	Yes 10 (32.2%)
2. If yes, has it become better or worse?	Worse 8 (33.3%) Better 1 (4.1%)	Worse 6 (19.3%) Better 4 (12.9%)
3. If better, describe it.	Better	Just better
4. If worse, describe it	Incontinence, dysuria, pollakiuria, hesitancy, straying	Incontinence, hesitancy, direction urinary stream
5. Did you get any urinary infection after SRS?	11 (45.8%)	10 (32%)
6. If yes, how many times?	Mean 3.3 episodes	Mean 1.7 episodes
7. How many times per day do you urinate?	Mean 5.6	Mean 5.4
8. Do you urinate at night?	Yes 9 (37.5%)	Yes 13 (41.2%)
9. Do you suffer of incontinence?	Yes 12 (50%)	Yes 6 (19.3%)
10. If yes, describe it.	Post voiding 3 Continuously 9	Dribbling 1 Urge incontinence 2 Stress incontinence 2 Mixed incontinence 1
11. Do you suffer of loss of drops after voiding?	Yes 19 (79.1%)	Only FTM
12. If not, describe how you prevent it.	By pushing the urethra 9 (37.5%)	Only FTM
13. Do you ever suffer of urinary infection after sexual intercourse after SRS?	Only MTF	Yes 4 (3.7%)

Table 2

Pre- and postoperation uro-flow results

Q_{\max} preoperative	Q_{\max} postoperative	Wilcoxon
Mean 16.0	Mean 14.0	$P = 0.3$
SD 17.8	SD 9.7	

(Questions 1–2). In 8 patients (33.3%) voiding was worse, in 1 patient (4.1%) it was better, and in the remainder (62.6%) voiding was unchanged. For those where voiding was worse, 4 patients complained about incontinence, 1 about dysuria, 1 about pollakisuria, 1 about hesitancy and 1 about straying of the urinary stream.

Incontinence was reported by 12 patients (50%) (Questions 9–10): for 3 (12.5%) this occurred post-voiding only whereas 9 patients (37.5%) had this problem all the time. Nineteen patients (79.1%) reported loss of urine specifically after voiding (Question 11): 9 (37.5% of the total) patients were able to prevent the dribbling by pushing (Question 12), whereas for 3 patients (12.5% of the total) dribbling occurred even after pushing. Urinary infection (Questions 5–6) had been experienced by 11 patients (45.8%) with an average of 3.3 episodes (range: 1–6) per patient.

The average number of voids per day for FTM patients was 5.6 (range: 3–10); 9 patients in this group (37.5%) reported nocturia (Question 8).

3.2. Male-to-female

Of the 31 patients in this group, 32.2% ($n = 10$) affirmed that voiding had changed after phalloplasty: for 6 of them (19.3% of the total) voiding was worse, for 4 (12.9%) it was better, and for the rest (67.8%) it was neither worse nor better. On the nature of changes for the worse (Question 4), 6 patients reported incontinence, 1 slower urination time, 1 hesitancy and 1 complained that the direction of the urinary stream was too forward.

When questioned about incontinence (Questions 9–10), 6 patients (19.3%) affirmed the loss of urine: 1 referred to dribbling, 2 to urge incontinence, 2 to stress incontinence, and 1 had mixed incontinence.

Urinary infection (Questions 5–6) was a problem for 10 patients (32%) who reported an average of 1.7 episodes (range: 1–6). In this group, urinary infection specifically after intercourse was reported by 4 (3.7%) of the 27 patients who practiced vaginal sex (Question 13). The number of voids per day averaged 5.4 (range: 2–10) for male-to-female transsexuals; nocturia was reported by 13 (41.2%) of these patients.

3.3. Uro-flowmetry

The flowmetry examination of 92 FTM operated transsexuals showed a decrease in the mean Q_{\max} from 16 ml/s to 14 ml/s which was not statistically significant ($p = 0.3$) (Wilcoxon matched pairs test). Results are given in Table 2. Significant residual urine was not observed (mean < 10 ml).

4. Discussion

Many reports have been published on complications arising after SRS in FTM and in MTF transsexualism [9–26]. These publications mainly refer to severe complications like urethral fistulae, urethral strictures and meatal stenoses; such complications are easily observed and need further surgical treatment in order to correct them. However, even if the SRS is uncomplicated, some changes in lower urinary tract function can still, theoretically, be expected. Next to the change of urethral length (shorter in MTF and longer in FTM), there is the change in voiding habits, like voiding while standing. Voiding frequency can also change; some incontinence can be expected especially in FTM and even some minor changes caused by subclinical obstruction. In order to investigate these theoretical problems, we designed this retrospective study. It showed that 33.3% and 19.3%, respectively, of the FTM and MTF transsexuals, reported changes in their voiding habits after SRS.

Post-voiding incontinence was most frequently reported in the FTM group. At the origin of this problem is the urethral structure which, compared with a biological male urethra, is no longer a virtual space but a real space that can trap urine. Furthermore, differences in compliance, with a highly compliant perineal urethra, and a poorly compliant phallic urethra, can cause further pooling of urine. In our surgical technique, the pars fixa of the urethra is reconstructed using flaps from the labia minora and a small vaginal flap, as described by Gilbert [3], Edgerton [32] and Bowman [33]. The pars pendulans is reconstructed by turning the radial forearm flap in a tube shape [27]. With this technique, the neourethra creates a siphon, with the lowest part at the level of the junction between the old female urethra exit and the proximal part of the

pars fixa of the new urethra. This siphon effect accumulates urine, especially during the last part of voiding when its strength decreases, so that urine pushed to the pars fixa as well as to the pars pendulans of the urethra no longer has sufficient force to exit; thus it comes back into the siphon. Later, during the day, compression of the siphon (by pushing on it roughly at the base of the reconstructed scrotum) can empty it; in our study, 75% of patients who practice this manoeuvre were able to push the urine out.

In addition, the urethra is reconstructed from the labia minora (and in a minor way by the vaginal flap) and by the skin of the forearm, each lacking completely any muscular and elastic fibres: this increases the difficulty in the transmission of the urine flow. Lately, we have developed a new technique in order to overcome this problem. We now try to identify the perineal muscles (bulbocavernosus and ischiocavernosus muscles) and wrap them around the perineal urethra. Some patients report that they can use these muscles to empty their perineal urethra.

Comparing the first two questions asked to the FTM group, 48% reported loss of urine in response to a general question. However, when the same question was specifically addressed to loss after voiding (dribbling), 79.1% replied positively. One explanation for these different replies may be that some patients do not attach much importance to the loss of drops. Not all of them consider it a real problem, so when a general question concerning the loss of urine was formulated, only a minor proportion (48%) replied positively.

Compared with the FTM group, less urinary changes were present in the MTF group. Their major change was incontinence, present in 16% of the operated MTF (2 urge, 2 stress, 1 mixed incontinence). However, incontinence was not considered as a problem by all affected patients; in fact, only 1 patient was seeking medical help for it.

Different hypotheses can be proposed for the observed lower urinary tract symptoms in MTF transsexuals. Most important of these must be the effect of the surgery. During vaginoplasty, a pocket is created between the bladder and the rectum that will contain the neovagina. This pocket is created by blunt dissection behind the prostate. The sphincter complex and the pelvic floor muscles are in the dissected area, so some of the observed stress incontinence could be attributed to the surgery. Furthermore, the dissection is in the area of the nerves supplying the bladder. Nerve damage could, therefore, be the origin of the observed urge incontinence. Finally, creating a vagina behind the bladder changes the anatomical position of the bladder,

which in itself could be the source of some bladder over-activity.

When compared with a normal population, the number of voids per day was not increased, for either the FTM or the MTF population. Patients in both groups, however, reported nocturia. In addition, a high number of urinary tract infections (UTI) were reported, the incidence being 46% and 32%, respectively, in the FTM and MTF groups.

Most infections are observed in the post-operative period and it may be that adaptation to new voiding habits takes some time. In FTM patients, residual urine after voiding is often observed in the first post-operative months. As in these patients the neourethra is reconstructed from perineal mucosa and forearm skin, we postulate that this urethra is highly colonized by bacteria. The high bacterial load could explain the observed UTI problem. In fact, many patients present with a *Staphylococcus aureus* infection, which reflects colonizing bacteria of the forearm skin. The eventual presence of hairs (coming from the forearm) creates an environment for further colonization of the urethra.

In the MTF group the shortening of the urethra could explain the rate of infection. In general, males are better protected than females against UTI because of the longer urethra and the absence of bacteria in the prostatic urethra. After surgery it is postulated that the prostatic urethra can become colonized by uropathogens. However, infection after vaginal intercourse in the MTF group was low (<4%).

The flowmetry performed in the FTM group showed a non significant decrease in Q_{\max} of 2 ml/s. This change might be due to the slight obstruction caused by the neourethra, and by the absence of muscular or mucosal tissue at the pars pendulans, this being reconstructed using cutaneous tissue alone. Likewise, the absence of muscular tissue at the level of the pars fixa of the urethra, this being replaced by mucosal tissue alone, might affect the Q_{\max} . Although non significant, the final effect of decreased flow over the long term remains an unanswered question. For this reason the patients deserve life long follow up.

5. Conclusion

No change in lower urinary tract function was observed after SRS in 55 transsexual patients. Some lower urinary tract symptoms, like post-void dribbling and some incontinence, were reported but these changes were not considered as problems by most patients; only one of the group studied had sought

medical help for his problem. Patients should, however, be informed before surgery that SRS can cause lower

urinary tract symptoms, which eventually may lead to discomfort.

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